FIG. 1

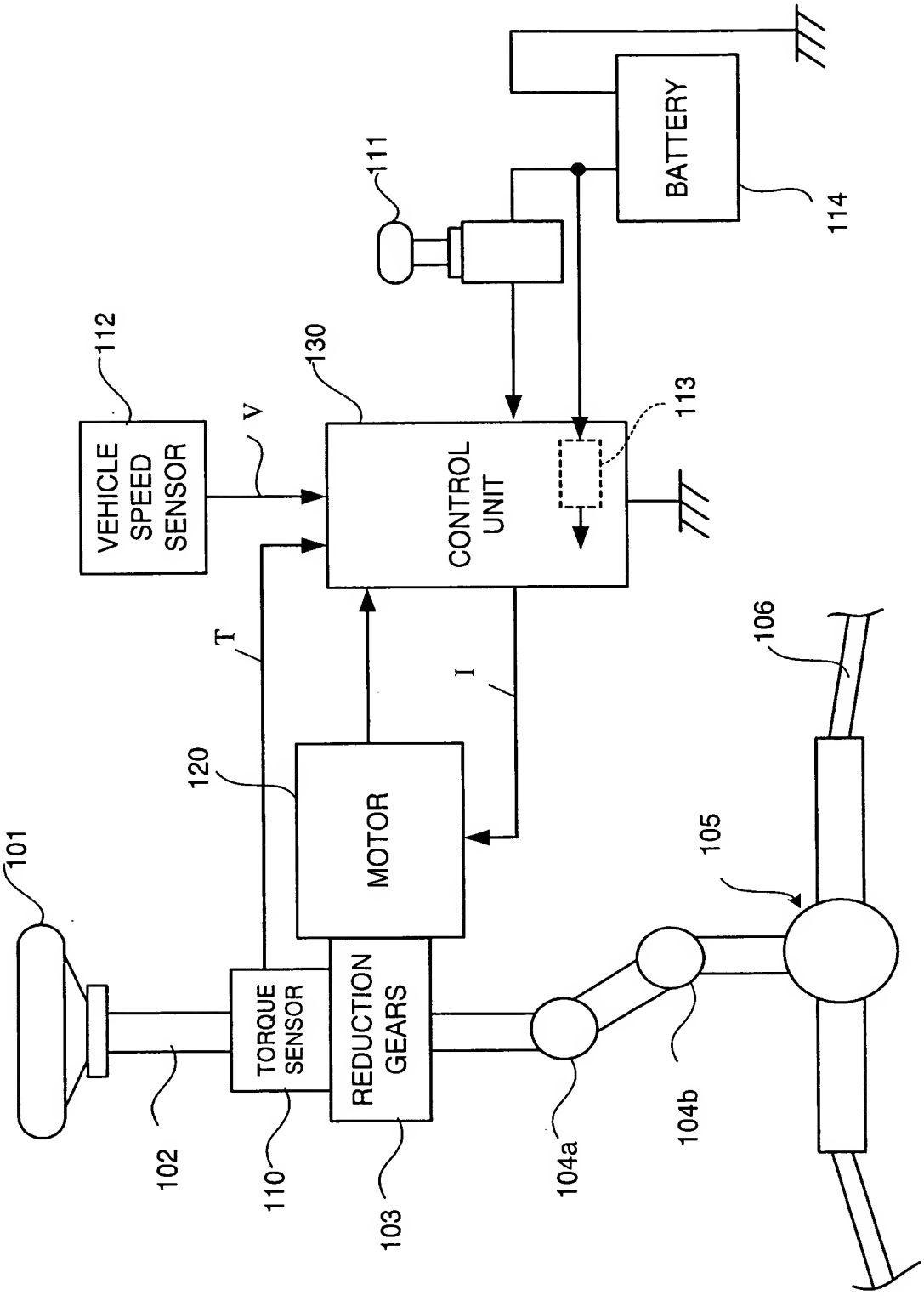

BATTERY
114
111
112
VEHICLE SPEED SENSOR
V
130
CONTROL UNIT
113
T
I
120
MOTOR
106
105
101
TORQUE SENSOR
REDUCTION GEARS
102
110
103
104a
104b

FIG. 2

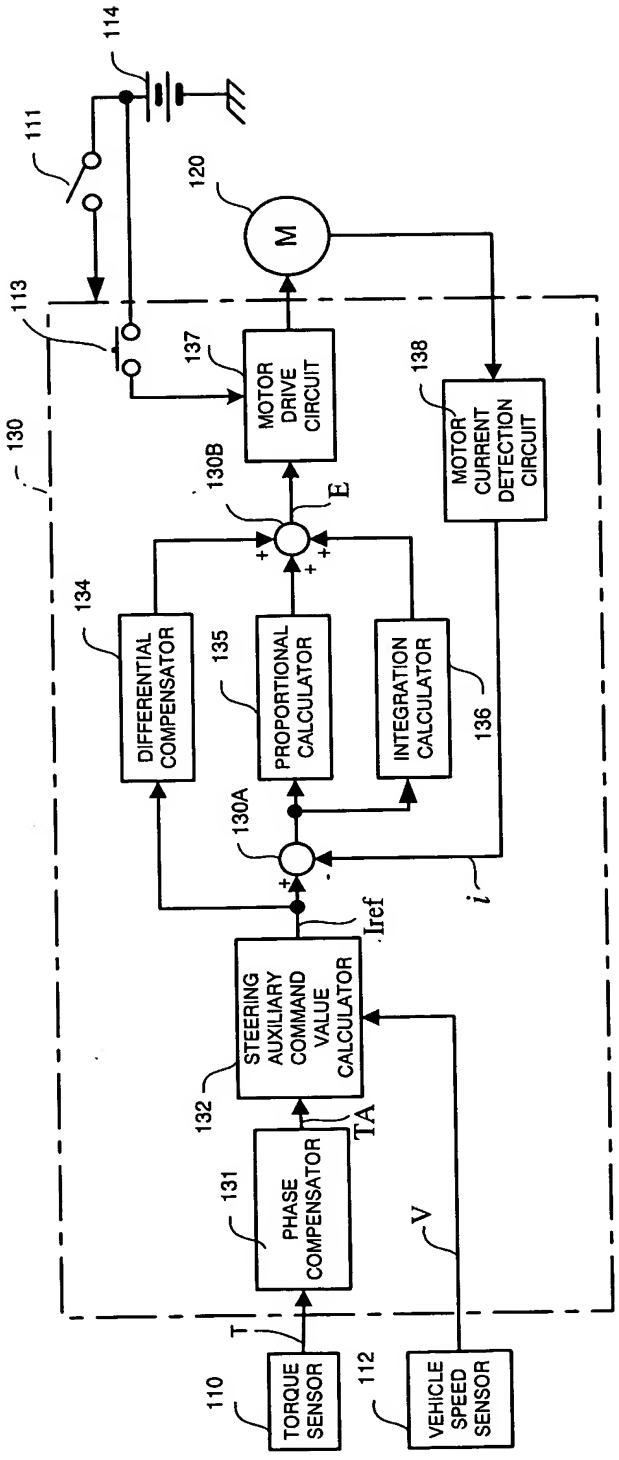

114
111
120
M
113
137
MOTOR DRIVE CIRCUIT
138
MOTOR CURRENT DETECTION CIRCUIT
130
130B
E
134
DIFFERENTIAL COMPENSATOR
135
PROPORTIONAL CALCULATOR
INTEGRATION CALCULATOR
136
130A
i
Iref
STEERING AUXILIARY COMMAND VALUE CALCULATOR
132
TA
131
PHASE COMPENSATOR
V
T
110
TORQUE SENSOR
112
VEHICLE SPEED SENSOR

FIG. 3

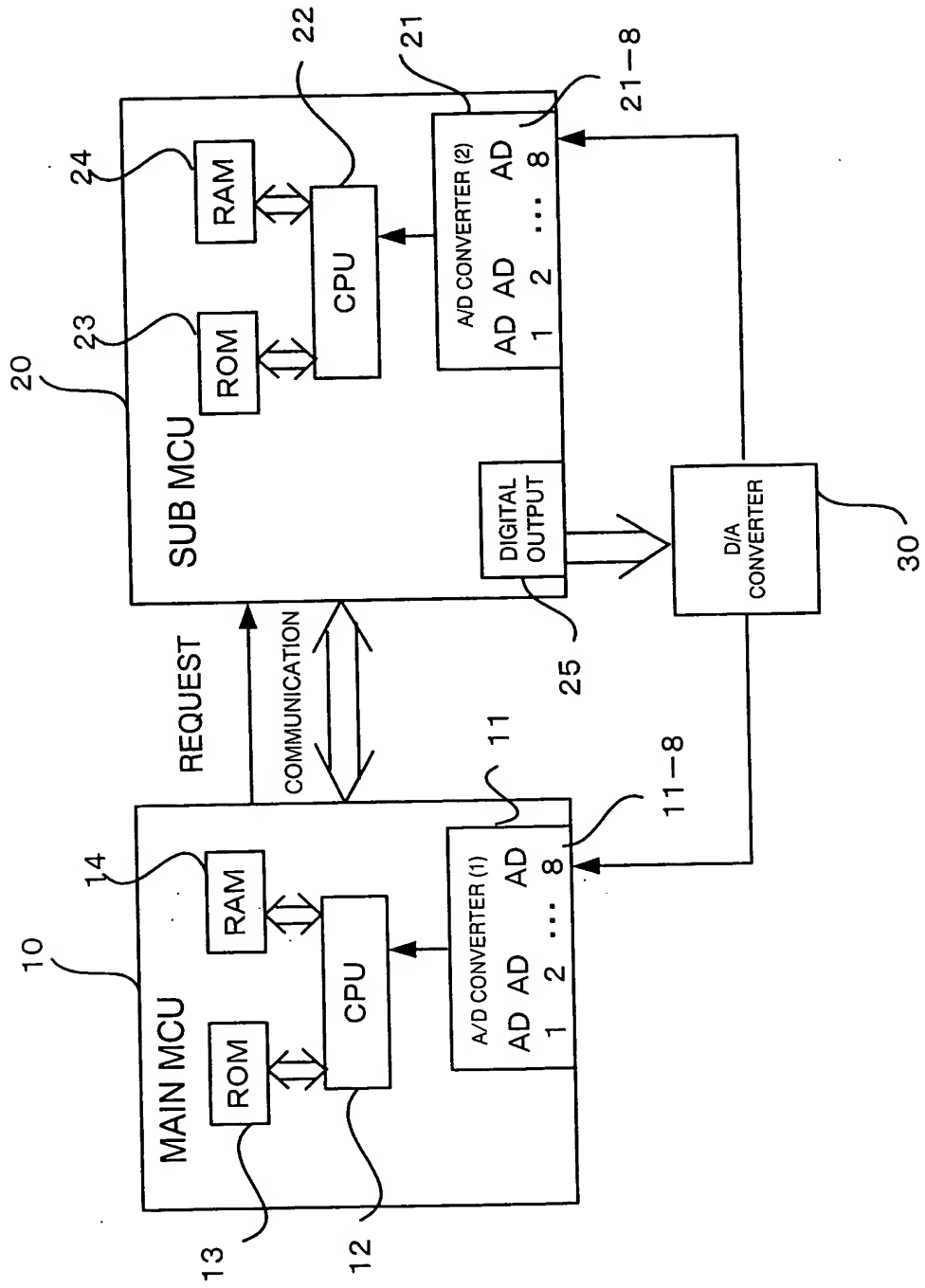

MAIN MCU
SUB MCU
CPU
ROM
RAM
A/D CONVERTER (1)
A/D CONVERTER (2)
AD 1
AD 2
AD 8
DIGITAL OUTPUT
D/A CONVERTER
REQUEST
COMMUNICATION
10
11
11-8
12
13
14
20
21
21-8
22
23
24
25
30

FIG. 4

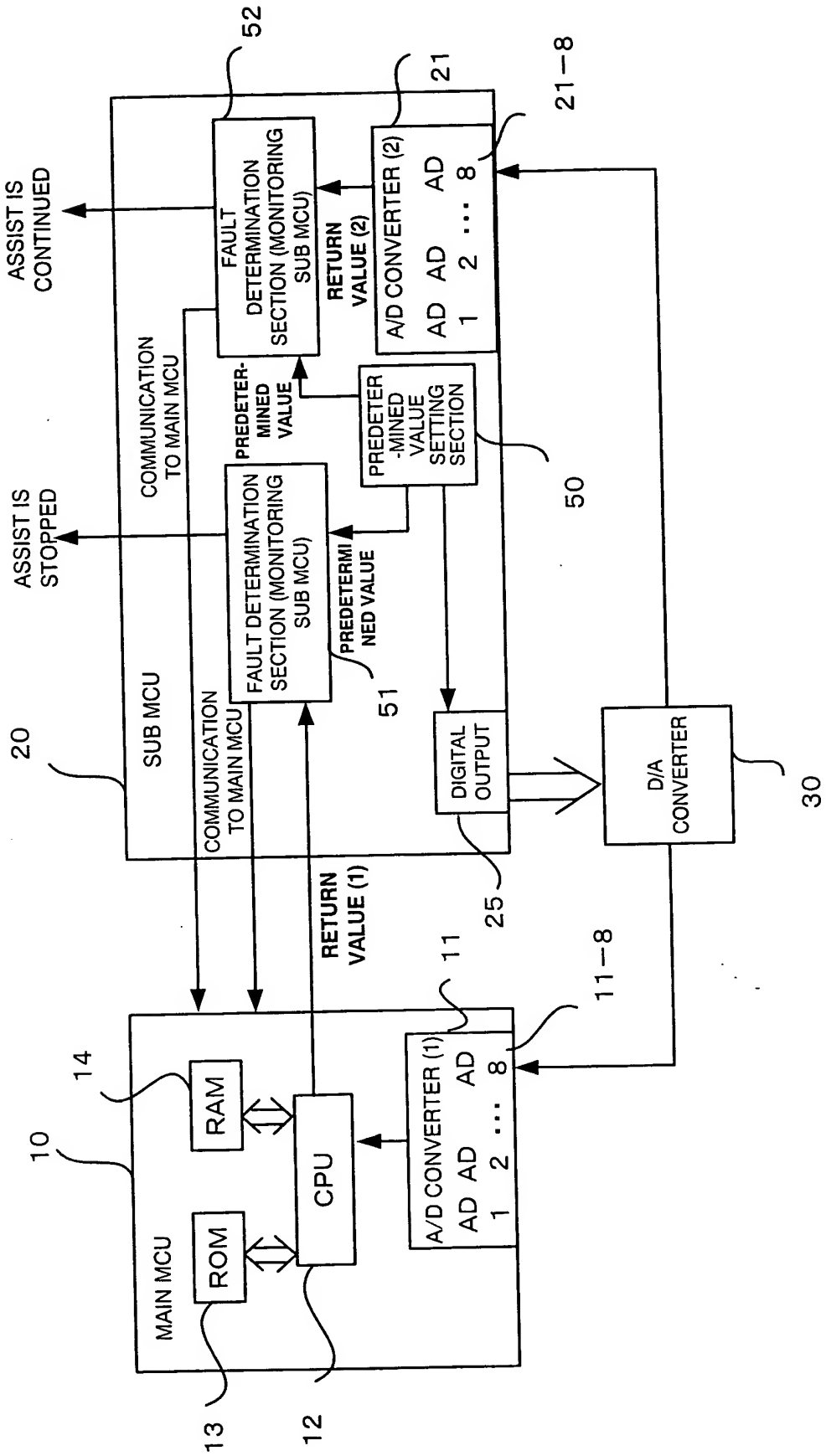

ASSIST IS CONTINUED
ASSIST IS STOPPED
SUB MCU
20
COMMUNICATION TO MAIN MCU
COMMUNICATION TO MAIN MCU
FAULT DETERMINATION SECTION (MONITORING SUB MCU)
52
FAULT DETERMINATION SECTION (MONITORING SUB MCU)
51
PREDETER-MINED VALUE
PREDETERMINED VALUE
PREDETER-MINED VALUE SETTING SECTION
50
RETURN VALUE (2)
A/D CONVERTER (2)
AD 1 AD 2 ... AD 8
21
21-8
DIGITAL OUTPUT
25
D/A CONVERTER
30
RETURN VALUE (1)
11
11-8
A/D CONVERTER (1)
AD 1 AD 2 ... AD 8
MAIN MCU
10
RAM
14
ROM
13
CPU
12

FIG. 5

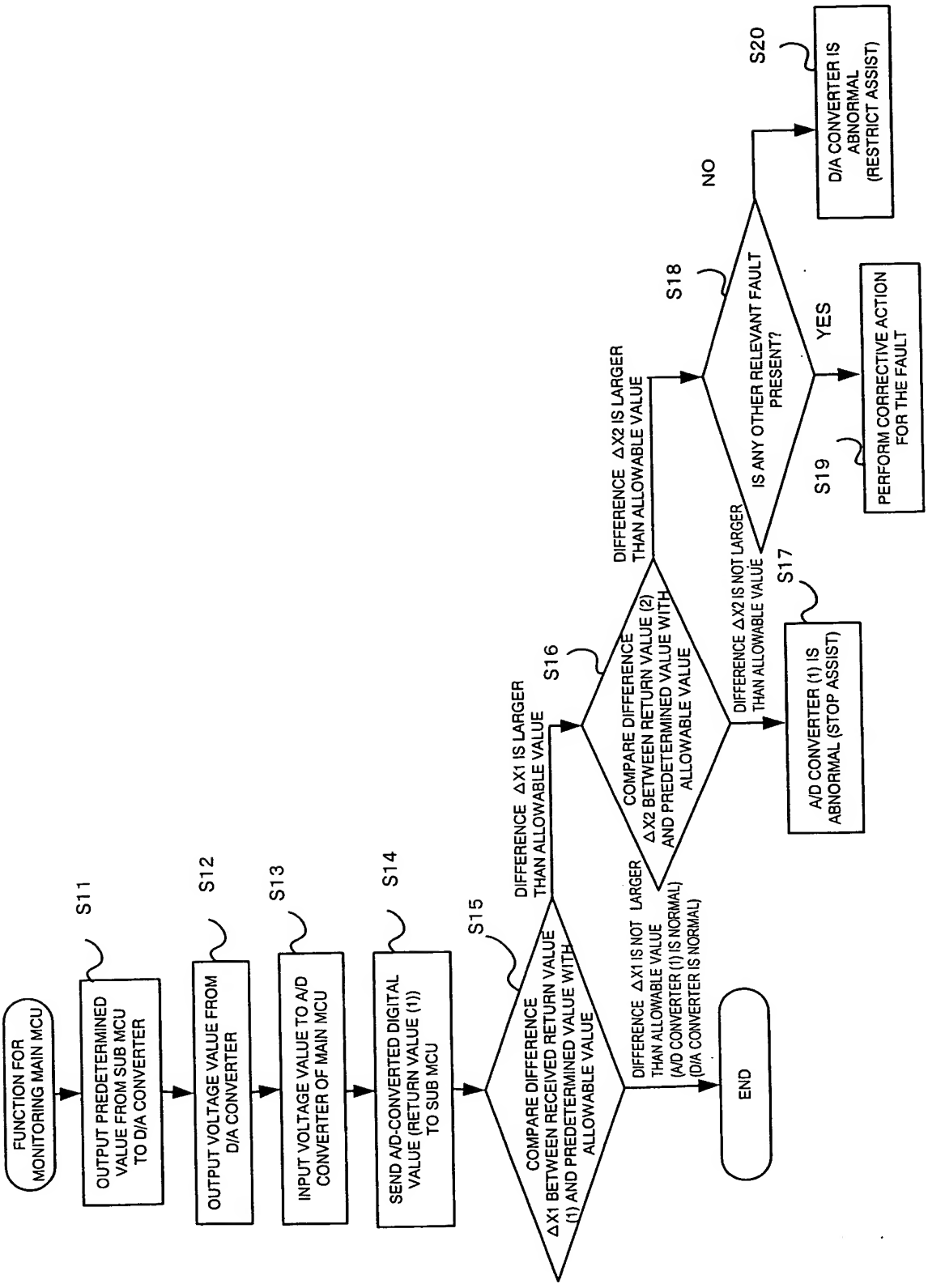
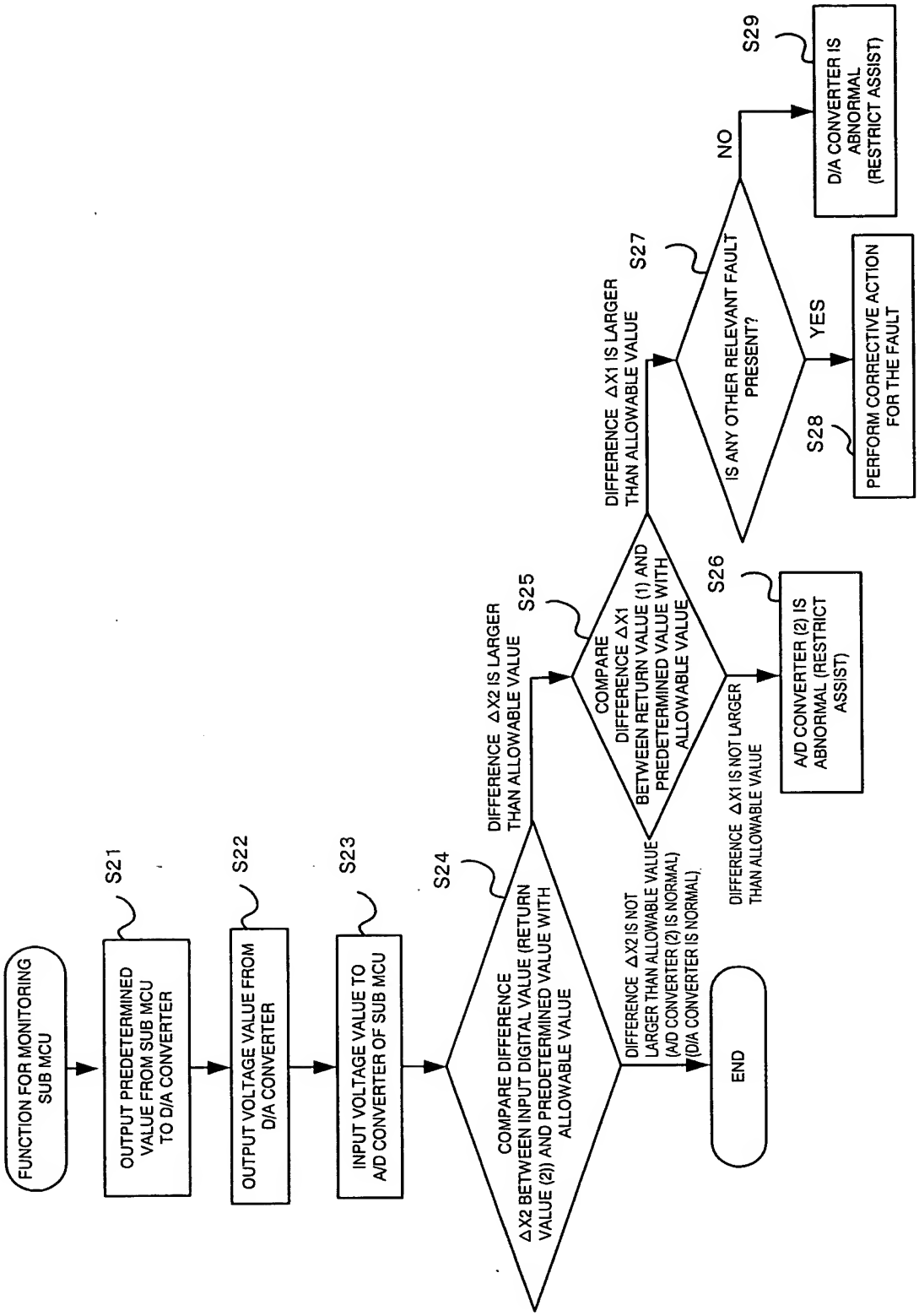

FUNCTION FOR MONITORING MAIN MCU
S11
OUTPUT PREDETERMINED VALUE FROM SUB MCU TO D/A CONVERTER
S12
OUTPUT VOLTAGE VALUE FROM D/A CONVERTER
S13
INPUT VOLTAGE VALUE TO A/D CONVERTER OF MAIN MCU
S14
SEND A/D-CONVERTED DIGITAL VALUE (RETURN VALUE (1)) TO SUB MCU
S15
COMPARE DIFFERENCE ΔX1 BETWEEN RECEIVED RETURN VALUE (1) AND PREDETERMINED VALUE WITH ALLOWABLE VALUE
DIFFERENCE ΔX1 IS NOT LARGER THAN ALLOWABLE VALUE (A/D CONVERTER (1) IS NORMAL) (D/A CONVERTER IS NORMAL)
END
DIFFERENCE ΔX1 IS LARGER THAN ALLOWABLE VALUE
S16
COMPARE DIFFERENCE ΔX2 BETWEEN RETURN VALUE (2) AND PREDETERMINED VALUE WITH ALLOWABLE VALUE
DIFFERENCE ΔX2 IS NOT LARGER THAN ALLOWABLE VALUE
S17
A/D CONVERTER (1) IS ABNORMAL (STOP ASSIST)
DIFFERENCE ΔX2 IS LARGER THAN ALLOWABLE VALUE
S18
IS ANY OTHER RELEVANT FAULT PRESENT?
NO
S20
D/A CONVERTER IS ABNORMAL (RESTRICT ASSIST)
YES
S19
PERFORM CORRECTIVE ACTION FOR THE FAULT

FIG. 6


FUNCTION FOR MONITORING SUB MCU
S21
OUTPUT PREDETERMINED VALUE FROM SUB MCU TO D/A CONVERTER
S22
OUTPUT VOLTAGE VALUE FROM D/A CONVERTER
S23
INPUT VOLTAGE VALUE TO A/D CONVERTER OF SUB MCU
S24
COMPARE DIFFERENCE ΔX2 BETWEEN INPUT DIGITAL VALUE (RETURN VALUE (2)) AND PREDETERMINED VALUE WITH ALLOWABLE VALUE
DIFFERENCE ΔX2 IS LARGER THAN ALLOWABLE VALUE
S25
COMPARE DIFFERENCE ΔX1 BETWEEN RETURN VALUE (1) AND PREDETERMINED VALUE WITH ALLOWABLE VALUE
DIFFERENCE ΔX1 IS LARGER THAN ALLOWABLE VALUE
S27
IS ANY OTHER RELEVANT FAULT PRESENT?
NO
S29
D/A CONVERTER IS ABNORMAL (RESTRICT ASSIST)
YES
S28
PERFORM CORRECTIVE ACTION FOR THE FAULT
DIFFERENCE ΔX2 IS NOT LARGER THAN ALLOWABLE VALUE (A/D CONVERTER (2) IS NORMAL) (D/A CONVERTER IS NORMAL)
END
DIFFERENCE ΔX1 IS NOT LARGER THAN ALLOWABLE VALUE
S26
A/D CONVERTER (2) IS ABNORMAL (RESTRICT ASSIST)